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Department of Defence  
Defence Science and Technology Organisation  
[Armed Forces Food Science Establishment]  
Scottsdale, Tasmania

AFFSE REPORT 2/78

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# DEFENCE FOOD RESEARCH- ACTIVITIES REPORT.

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11 Apr 78

10 Ross J. Richards

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ACTIVITIES REPORT

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AFFSE REPORT 2/78

## DEFENCE FOOD RESEARCH

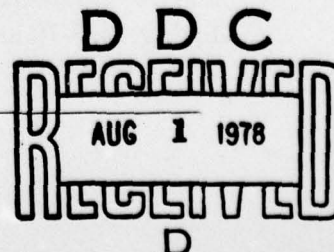
### ACTIVITIES REPORT

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#### SUMMARY

Highlights of the research and development programmes in defence food science conducted at the Armed Forces Food Science Establishment during 1975-78 are described.

Postal Address: The Director,  
Armed Forces Food Science Establishment,  
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## INTRODUCTION

This summary report of the activities of the Armed Forces Food Science Establishment covers the period 1975-1978 and continues the series begun in 1958.

The report has been prepared as an information document primarily for consideration by member countries of the Commonwealth Defence Science Organisation/Food Study Group and is not a detailed report on all activities of the AFFSE. Specific technical information is contained in reports issued by the Establishment and these are distributed according to an agreed list. The 1973 Activities Report contained a list of publications to that time. This report includes titles of publications since then and enquiries on the research and development programme of the AFFSE are welcomed.

They should be addressed to the:

Defence Food Science Adviser,  
P.O. Box 147,  
SCOTTSDALE, Tasmania, Australia, 7254.

(ROSS J. RICHARDS)  
Director, and  
Defence Food Science Adviser.



## ACTIVITIES REPORT

At the 1975 meeting of the FSG in Mysore, India, Australia reported major organisational changes in the Defence group of departments with special reference to the Armed Forces Food Science Establishment. Since that time, reorganisation of the AFFSE from an Army Logistic Command unit to an Establishment in the Australian Defence Science and Technology Organisation (DSTO) has continued to the point where all major changes have been completed. As a result of the reorganisation, new procedures for administration, tasking and budgetting have been introduced along with altered reporting responsibilities. The DSTO has not yet settled its policy for matters such as Annual Reports and accordingly no reports in this form have been issued by the AFFSE for the past several years.

The Service Laboratories and Trials Division (SLT) of which the AFFSE is a part, is composed of seven laboratories with responsibilities in Defence Science to the three Armed Services. The Division has made a number of presentations to senior service officers and these have resulted in much more work being requested from the Services. The research and development programme of the AFFSE has been directed previously to the needs of the Army as the most obvious user of its expertise. The tri-service role of the Establishment has become much more evident since 1975 as its capabilities have been better known to Air Force and Navy. A large number of visitors including senior Service personnel, DSTO scientists, civil scientists and food industry representatives has come to the AFFSE in the last two years and these visits have often been followed by formal task requests in food science and technology.

The AFFSE continues to pursue a research and development programme in defence food science as a result of actual and perceived needs of the Australian Defence Forces. The basic charter of the Establishment is to determine the energy and nutrient needs of servicemen under all conditions in which they may be expected to operate and to translate these into ration packs for combat purposes and ration scales for static mess use. This wide charter is interpreted liberally but with continuing attention to the special needs of defence science. The DSTO has introduced a new system of planning and executing its tasks under the Five Year Defence Plan and the Planning Base which allows all tasks in defence science to be presented under 20 specific application elements and 8 research elements. The AFFSE has tasks in two elements — Interaction of Personnel and the Military Environment and Biological, Medical and Behavioural Sciences. This is a significant change in the method of operation reported previously and in place of the large number of projects attempted in previous



years the AFFSE now has five major tasks. These tasks cover food processing technology, food packaging, laboratory and field evaluation of ration packs, service feeding systems and nutritional parameters. Some highlights of the research, development, trials and evaluation programme are given below.

Further effort has been directed at the accelerated freeze-drying process as a food processing method capable of providing defence food having special advantages and for use in specialised situations. The Army has decided that there is a continuing need for a lightweight patrol ration and freeze-dried foods supply the main component for this ration. The AFFSE has a Budge cyclic unit capable of producing 100 kg of dried food from approximately 25 square metres of drying area. Currently, six composite meal varieties are being produced in a developmental project that allows Army to produce a patrol ration and the AFFSE to investigate various parameters in freeze-drying technology, e.g., tray densities, temperature profiles, vacuum break. Associated with the freeze-drying project are several packaging problems. Due to the nature of the dried food, package failure through pin holing or faulty seam construction can be a serious quality control problem. Various flexible laminates and inner packages are being evaluated to minimise these problems. Initial trials with the packing of water for survival purposes have been completed and the plastics bags containing 250 ml of water put into operation by the Royal Australian Air Force. The concept appears to have been well received and further progress will be made in the actual filling and sealing of the bags. A RAAF specification for the water was prepared and promulgated jointly.

Laboratory and field evaluation of the existing operational rations has been facilitated by the installation of an automatic nitrogen analyser, an automatic fat analyser and a mini computer.

Laboratory analyses on packs after initial packing and after storage at various temperatures for up to two years are done for carbohydrate, fat protein, moisture, salt, ash, thiamine and ascorbic acid. Energy values are determined for the total packs, and the energy provided by protein, fat and carbohydrate is calculated. This information is used by the procurement agencies and form part of the basis for recommended changes to packs. An extensive programme of field evaluation has been in operation for the past three years following an increase in scientific staff and the acquisition of a computer. Field data gathered from a range of troops on military exercises are being processed as a further aid in ration pack modification. Various small changes to packs have been made and an extensive revision will be made when the analyses are complete.

The development of new Defence feeding systems is being investigated by a combined working party in Army involving many directorates and the Defence Food Science Adviser (DFSA). New concepts for feeding in the area of operations have been defined and lead up trials are to begin in 1978. The philosophy of feeding troops on fresh rations whenever possible is central to the study. Trials in semi-tropical areas have been concluded successfully and these will be followed by extensive trials on large military exercises in arid and semi-arid locations in Australia. The lessons learnt from participation in hostilities in jungle areas are of little value when feeding systems have to be adapted for different climatic and logistic environments.

For some time there has been acknowledged a need for extensive analysis of Australian foods to bring up to date food composition tables and dietary habits of the civilian population. Funding for this work in several Universities has become available and projects are to begin in 1978. The AFFSE will participate indirectly in these programmes by an expanded analytical programme on ration pack components. Additional compositional parameters such as vitamins, pesticides and trace metals will be determined.

Contract research at the University of Adelaide on the pre-treatment of meat before freeze-drying to improve texture on reconstitution has been concluded. The study showed that treatment with formaldehyde and washing with buffers produced meat after freeze-drying and reconstitution that was less tough than non-treated meat. Field trials on acceptability and scaling up experiments on the process have not been done yet.

The Royal Australian Navy has tasked the AFFSE recently to investigate the energy needs of underwater divers in relation to combat efficiency. Serious discrepancies in their feeding habits have been detected and further investigations into the detailed requirements of these personnel have begun. Navy are showing interest in the rationing procedures used by Army, and the DFSA is briefing Navy on the system. The Ration Scales Committee, which determines food entitlements for Army and RAAF, continues to modify its recommendations and interest in this is being shown by Navy. The RAAF has requested assistance from the AFFSE with problems associated with in-flight feeding due to the potentially increased requirement for this service to perform long range surveillance and detection flights.

The development of Australian Defence Forces Food Specifications continues to be supported by the AFFSE. The DFSA represents Defence on this committee and assists the Army, Air Force and Navy in their representa-

tions. An extensive revision of the specifications has been completed, including the section on analytical techniques and should be published in 1978. The functioning of this committee, with representation from Commonwealth Government departments, CSIRO, food industry associations and regulatory bodies continues to provide sound specifications for defence food purchasing. The contributions made by the food industry to the committee are an example of industry's willingness to assist with Australian defence needs. During the revision, microbiological standards (numerical) were added to the various foods and this is a major advance in the Australian food industry. The Standards Association of Australia (SAA) has made considerable progress in microbiological methods for food analysis over the last three years with methods now available for nearly all food and dairy products. These methods have been incorporated into the ADFFS. The AFFSE contributes to these processes by representation on the appropriate SAA committees. The ADFFS are being used increasingly by the civilian population as well as in countries in the Asian and S.E. Asian areas.

Progress with the expansion of laboratory facilities has been satisfactory. Final plans have been agreed and the project has a high priority for implementation. Construction is expected to begin in 1978. Additional land and buildings have been acquired to facilitate expansion. The recruitment of qualified experienced personnel is not difficult but restrictions on staff ceilings are reacting against the acceptance of new tasks from sponsors. This is a problem not peculiar to Defence. The two Army Reserve officer positions on the scientific staff are now filled by a Major and Lieut/Colonel. These officers assist with field exercises and special laboratory projects.

Liaison with industry is actively fostered by free exchange of information including reciprocal visits by scientific staff.





## PUBLICATIONS

- |         |  |
|---------|--|
| MR/118  | Notes on Food Requirements and Dehydrated Foods  |
| MR/118A | Technical Training in Food Science - Indonesia   |
| MR/119  | The Production of Emergency Flying Rations for the Royal Australian Air Force                  |
| MR/120  | Texture of Freeze-Dried Meat — Part II   |
| MR/121  | Texture of Freeze-Dried Meat — Part III  |
| CR6     | The Use of Formaldehyde and Phosphate in the Pre-treatment of Meat before Freeze-Drying        |
| CR7     | Experiments on the Preparation of Dried Meat   |
| 1/74    | Eight Days Sea Survival — Blythe Star Episode  |
| 1/75    | Defence Food Research — Activities Report  |
| 2/75    | Laboratory Evaluation of Australian Ration Packs   |
| 3/75    | The Diet of Australian Servicemen in Barracks  |
| 1/76    | Laboratory Evaluation of Australian Ration Packs   |
| 2/76    | The Effect of Variety on Dehydration and Long Term Storage of Carrots ( <i>Daucus carota</i> ) |
| 1/77    | Microbiological Quality Control of Freeze-Dried Foods  |
| 2/77    | Sensory Food Evaluation  |
| 3/77    | The Effects of Feeding Formaldehyde Treated Meat to Rats                                       |
| 4/77    | The Effect of Variety on Quality after Dehydration of Onions ( <i>Allium cepa</i> )            |
| 5/77    | Operation Seaspray — Trial on Liferaft Rations   |
| —       | Effect of Processing Conditions and Additives on the Texture of Stored Freeze-Dried Beef       |
| —       | Freeze Drying in the Food Industry   |
| —       | Freeze Drying of Foods   |
| —       | Processed Meats for Overseas Export  |
| —       | Texture of Freeze-Dried Meat — Effect of Pre-Processing Treatments                             |
| —       | Nutritive Value of Australian Armed Forces Ration Packs  |
| —       | Development of Survival Rations — Nutritional and Packaging Considerations                     |
| —       | Experimental Freeze-Dehydration of Composite Meals for the Australian Patrol Ration            |
| —       | Food Consumption Patterns in Static Messes — Caloric Availability and Wastage                  |

